IMAGE PROJECTOR SYSTEM OPERABLE IN A SLIDE PROJECTION MODE AND A LIQUID CRYSTAL PROJECTION MODE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to an image projector system, more particularly to an image projector system operable in a slide projection mode and a liquid crystal projection mode.

2. Description of the Related Art

In U.S. Patent No. 6,547,400, there is disclosed an image projector system that includes a point light source array, a light guide block, a liquid crystal display element, and a projection lens. The aforesaid image projector system, however, is not designed for use with projector slides.

SUMMARY OF THE INVENTION

Therefore, the object of the present invention is to provide an image projector system that is operable in a slide projection mode and a liquid crystal projection mode.

According to the present invention, an image projector system includes a cold light source, a projection lens, a slide retaining unit, and a liquid crystal module. The slide retaining unit is disposed between the cold light source and the projection lens, and is adapted to retain removably a projector slide between the cold light source and the projection lens

when the image projector system is operated in a slide projection mode. The liquid crystal module includes a liquid crystal panel retained removably on the slide retaining unit between the cold light source and the projection lens to permit operation of the image projector system in a liquid crystal projection mode.

BRIEF DESCRIPTION OF THE DRAWINGS

Other features and advantages of the present invention will become apparent in the following detailed description of the preferred embodiment with reference to the accompanying drawings, of which:

Figure 1 is a partly exploded perspective view of the preferred embodiment of an image projector system according to the present invention;

Figure 2 is an exploded perspective view of a cold light source of the preferred embodiment;

Figure 3 is an assembled perspective view of the preferred embodiment when operated in a liquid crystal projection mode; and

Figure 4 is an assembled perspective view of the preferred embodiment when operated in a slide projection mode.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to Figure 1, the preferred embodiment of an image projector system 5 according to the present invention is shown to include a housing 51, a projection lens 52, a cold light source 54, a slide retaining unit

55, and a liquid crystal module 56.

The housing 51 has front and rear portions. The projection lens 52, which is conventional in construction, is mounted on the front portion of the housing 51. The cold light source 54 is mounted in the rear portion of the housing 51. An operating space 53 is formed in the housing 51 between the projection lens 52 and the cold light source 54.

As shown in Figure 2, the cold light source 54 includes a light guide member 541 having a light incident side 545 for admitting incident light and a light output side 546 for outputting the incident light, and a light emitting unit 542 for providing the incident light to the light incident side 545 of the light guide member 541. In this embodiment, the light guide member 541 further has a light reflecting side 544 opposite to the light output side 546 and provided with a reflector layer 5440 thereon. The light incident side 545 extends between the light reflecting side 544 and the light output side 546. The light emitting unit 542 of this embodiment includes a rectangular mounting frame 548 and a plurality of light emitting diodes 547 mounted spacedly on the mounting frame 548 adjacent to the light incident side 545 of the light guide member 541. A covering frame 57 is provided on a periphery of the cold light source 54.

The actual configuration of the cold light source 54 should not be limited to that of the disclosed

embodiment. For instance, if high intensity diodes are in use, the light emitting unit may include only one diode row or even only one diode. Moreover, the cold light source may be implemented using a backlighting module with a cold cathode lamp, or other forms of cold light sources having a planar light output side for radiating cold light toward the slide retaining unit 55, such as those fabricated using Organic Light Emitting Diode (OLED) or Polymer Light Emitting Diode (PLED) techniques, in which a plastic or glass substrate is coated with an organic or polymeric light emitting material so as to provide a planar light output side for radiating cold light when electric power is supplied thereto.

Referring once again to Figure 1, the slide retaining unit 55 is disposed in the operating space 53 of the housing 51 between the projection lens 52 and the cold light source 54. The housing 51 is formed with a slide insert slot 552 registered with the slide retaining unit 55. In this embodiment, the slide retaining unit 55 includes a pair of slide rails 553, each of which extends downward from a respective end of the slide insert slot 552 so as to define a retaining space 554 therebetween.

The liquid crystal module 56 includes a slide frame 555 having a conventional liquid crystal panel 561 mounted thereon, a cover member 556 connected to one end of the slide frame 555, and a known control circuit

3 disposed in the cover member 556 and connected electrically to the liquid crystal panel 561. The cover member 556 is provided with a connector, such as a USB port connector or an AV port connector (not shown), to permit connection of the control circuit 3 to an image signal source 4. The image signal source 4 may be a computer, a personal digital assistant (PDA), a digital camera, a VCR, a DVD player, a memory card reader, or other forms of image output devices. The slide frame 555 is capable of removable and slidable engagement with the slide rails 553 of the slide retaining unit 55 so as to retain removably the liquid crystal panel 561 in the retaining space 554 between the cold light source 54 and the projection lens 52. The cover member 556 closes the slide insert slot 552 when the slide frame 555 is inserted into the housing 51 to prevent leakage of light through the slide insert slot 552, as best shown in Figure 3.

The image projector system 5 further comprises a second slide frame 555' adapted for mounting a projector slide 7 thereon and capable of removable and slidable engagement with the slide rails 553 of the slide retaining unit 55 so as to retain the projector slide 7 in the retaining space 554 between the cold light source 54 and the projection lens 52. The slide frame 555' has one end formed with a cover plate 556' to close the slide insert slot 552 when the slide frame 555' is inserted

into the housing 51 to prevent leakage of light through the slide insert slot 552, as best shown in Figure 4.

In use, as shown in Figure 3, to operate the image projector system 5 in a liquid crystal projection mode, the slide frame 555 of the liquid crystal module 56 is inserted into the housing 51 through the slide insert slot 552 until the cover member 556 closes the slide insert slot 552. The image projector system 5 is then placed in front of a screen 6, and the control circuit 3 of the liquid crystal module 56 is connected to the image signal source 4. When power is turned on, cold light from the cold light source 54 will be modulated by the liquid crystal panel 561 in a conventional manner according to the image signals received by the control circuit 3 from the image signal source 4. The modulated light from the liquid crystal panel 561 is then received by the projection lens 52 for subsequent projection onto the screen 6.

To operate the image projector system 5 in a slide projection mode, as shown in Figure 4, the projector slide 7 is mounted on the slide frame 555', and the slide frame 555' is subsequently inserted into the housing 51 through the slide insert slot 552 until the cover plate 556' closes the slide insert slot 552. The image projector system 5 is then placed in front of a screen 6. When power is turned on, the cold light from the cold light source 54 will pass through the projector slide

7 and the projection lens 52 for forming a corresponding image on the screen 6.

The image projector system of this invention offers advantages, such as wider range of use, lower energy consumption, longer service life, lower manufacturing cost, and simpler manufacturing process, as compared to the prior art.

While the present invention has been described in connection with what is considered the most practical and preferred embodiment, it is understood that this invention is not limited to the disclosed embodiment but is intended to cover various arrangements included within the spirit and scope of the broadest interpretation so as to encompass all such modifications and equivalent arrangements.